UNDERWATER BRIDGE INSPECTION REPORT

STRUCTURE NO. 88594

CSAH NO. 44

OVER THE

INDIAN CREEK

DISTRICT 1 – ST. LOUIS COUNTY

PREPARED FOR THE

MINNESOTA DEPARTMENT OF TRANSPORTATION

BY

COLLINS ENGINEERS, INC.

JOB NO. 3512 (CEI 6)

MINNESOTA DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION

REPORT SUMMARY:

The substructure units inspected at Bridge No. 88594, the North and South Abutments, were in satisfactory to poor condition. The North Abutment exhibited considerable movement with backfill escaping through gaps in the backwall planking. Repair measures, consisting of steel beams and shims, have held the pile cap in its present position thus far; however, the North Abutment should be further stabilized and repaired. A portion of the timber piles exhibited splitting up to 1/2 inch wide and delamination around the entire circumference.

INSPECTION FINDINGS:

(A) The east end of the pile cap at the South Abutment exhibited a 3-inch-wide vertical split, which extended from the end of the pile cap to Pile 2.

(B) Three timber piles at the North Abutment exhibited splitting and delamination around the entire circumference with the outer 1-inch thick shell being most affected.

(C) The pile cap at the North Abutment was rotated towards the embankment and was held in place with steel beams and shims. The northeast wingwall has failed and the east end of the backwall exhibited considerable movement with backfill escaping through 1-inch gaps between the planking. A portion of the backwall along the west end also exhibited a 1-foot-wide by 6-inch-high gap with 6 inches of penetration and signs of backfill escaping.

(D) Pile 6 at the South Abutment exhibited a 1/2-inch-wide, 1.5-inch-deep split extending from the pile cap to the mudline.

(E) The bottom plank of the Southwest Wingwall was 6 inches above mudline with 1 foot of penetration behind the wall.

RECOMMENDATIONS:

(A) Ideally, the North Abutment backwall and its northeast wingwall should be rebuilt and/or repaired to prevent further loss of backfill under the approach. Until repairs can be made, above and below water inspection should monitor the failing North Abutment components.

(B) Reinspect the submerged substructure units at the normal maximum recommended (NBIS) interval of five (5) years.

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

Daniel G. Stromberg

Date 6/30/2004 Registration No. 21491

Respectfully submitted,

COLLINS ENGINEERS, INC.

Daniel G. Stromberg
Registered Professional
Engineer, State of Minnesota

MINNESOTA DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION

1. BRIDGE DATA

Bridge Number: 88594

Feature Crossed: The Indian Creek

Feature Carried: CSAH NO. 44

Location: District 1 – St. Louis County

Bridge Description: The bridge superstructure consists of a one span timber deck on multiple steel stringers. The superstructure is supported by two timber pile abutments.

2. INSPECTION DATA

Professional Engineer Diver: Daniel G. Stromberg
State of Minnesota, P.E., No. 21491

Dive Team: Michelle D. Koerbel, Matthew J. Lengyel

Date: August 30, 2002

Weather Conditions: Sunny, " 75^{o} F

Underwater Visibility: "1 Foot

Waterway Velocity: None/Negligible

3. SUBSTRUCTURE INSPECTION DATA

Substructure Inspected: North and South Abutments.

General Shape: The North Abutment consists of a single row of six timber piles in front of timber planking which forms a breastwall, and the South Abutment consists of two rows of six timber piles in front of timber planking which forms a breastwall.

Maximum Water Depth at Substructure Inspected: Approximately 1.0 foot.

4. WATERLINE DATUM

Water Level Reference: The top of pile cap at downstream end of the North Abutment.

Water Surface: The waterline was approximately 2.3 feet below reference.
Assumed Waterline Elevation = 97.7.

5. NBIS CODING INFORMATION (Minnesota specific codes are used for 92B and 113)

Item 60: Substructure: Code 4

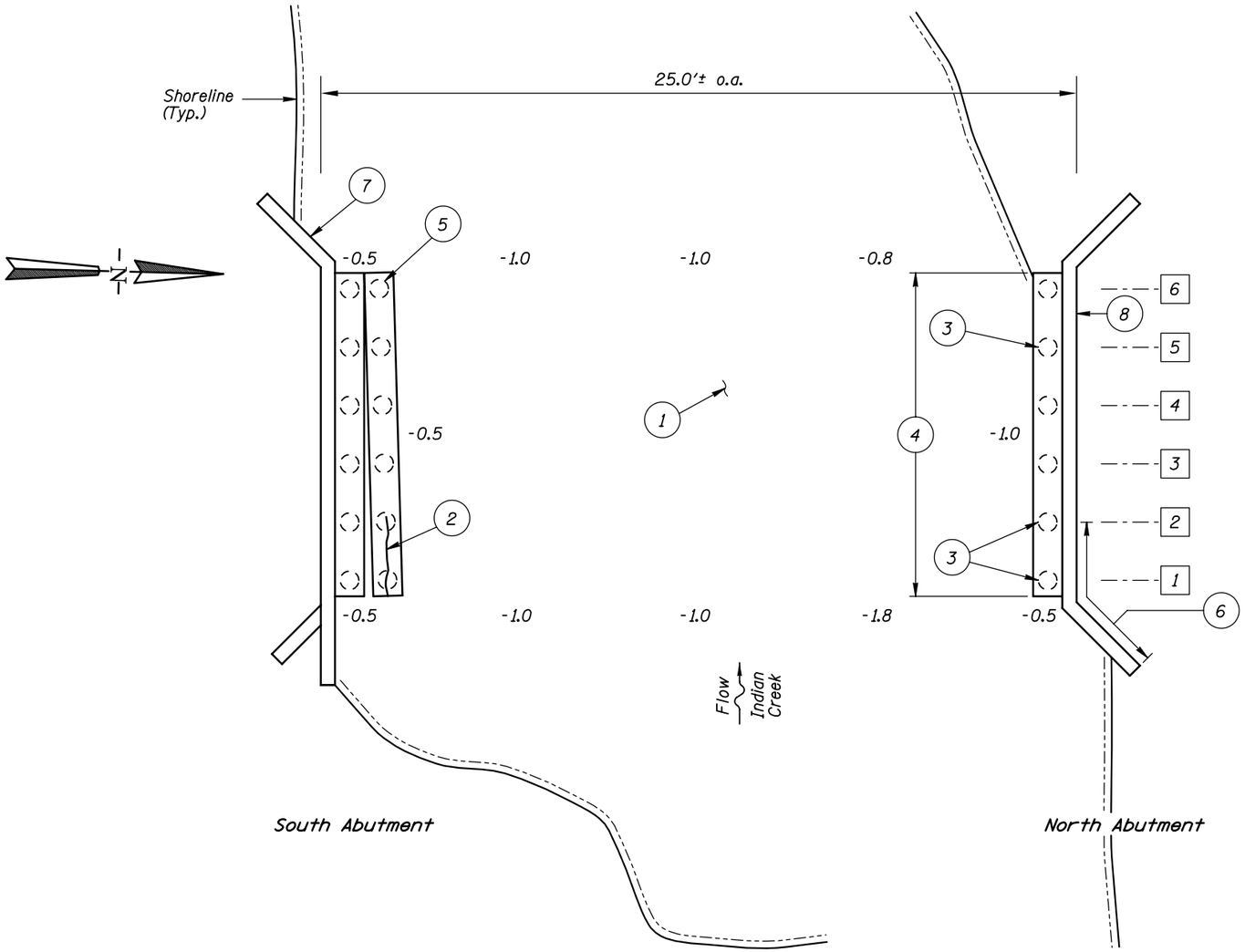
Item 61: Channel and Channel Protection: Code 7

Item 92B: Underwater Inspection: Code B/08/02

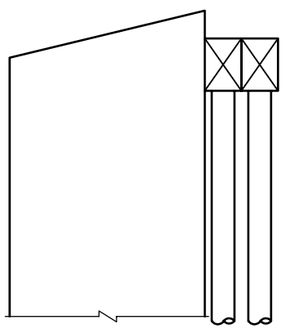
Item 113: Scour Critical Bridges: Code I/02

Bridge is scour critical because abutment or pier foundation is rated as unstable due to observed scour at bridge site.

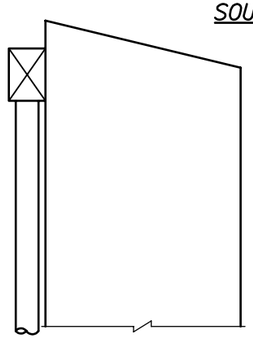
_____ Yes ___X__No



SOUNDING PLAN



END VIEW OF SOUTH ABUTMENT



END VIEW OF NORTH ABUTMENT

GENERAL NOTES:

1. The South and North Abutments were inspected underwater.
2. At the time of inspection on August 30, 2002, the waterline was located approximately 2.3 feet below the top of the cap at the downstream end of the North Abutment. Since insufficient bridge elevation information was available a reference elevation of 100.0 was assumed. Based on the assumed reference the waterline elevation was 97.7.
3. Soundings indicate the water depth at the time of inspection and are measured in feet.
4. Soundings were taken parallel to the bridge at 1/4 point intervals between the substructure units.

INSPECTION NOTES:

(1) The channel bottom consisted of silty sand with a maximum probe rod penetration of 1.5 feet.

(2) The pile cap exhibited a 3-inch-wide vertical split which extended from the end of the pile cap to Pile 2.

(3) The timber pile exhibited splitting and delamination around the entire circumference with the outer 1 inch shell being the most affected.

(4) The pile cap was rotated towards the embankment and was held in place with steel beams and shims.

(5) The timber pile exhibited a 1/2-inch-wide, 1.5-inch-deep split extending from the pile cap to the mudline.

(6) The wingwall has failed and the east end of the backwall exhibited considerable movement with backfill escaping through 1-inch-gaps between the planking.

(7) Bottom plank was 6 inches above mudline with 1 foot of penetration behind wall.

(8) Portion of backwall exhibited 1-foot-wide by 6-inch-high gap with 6 inches of penetration and signs of backfill escaping.

Legend

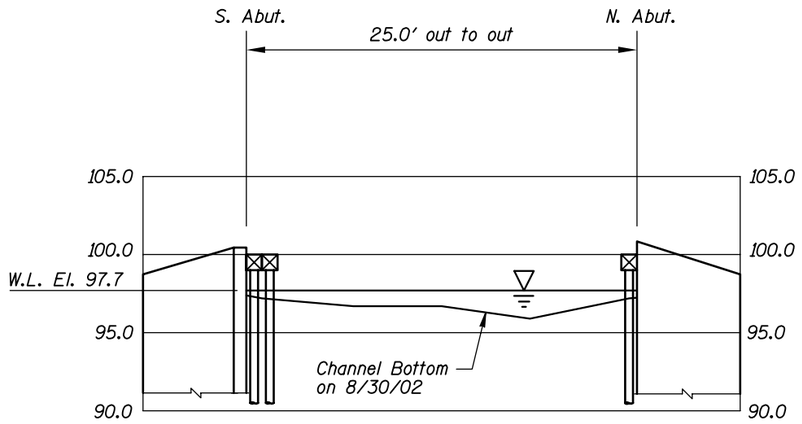
-3.0	Sounding Depth from Waterline (8/30/02)
( )	Timber Pile
[1]	Pile Identification Designation

MINNESOTA
DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION

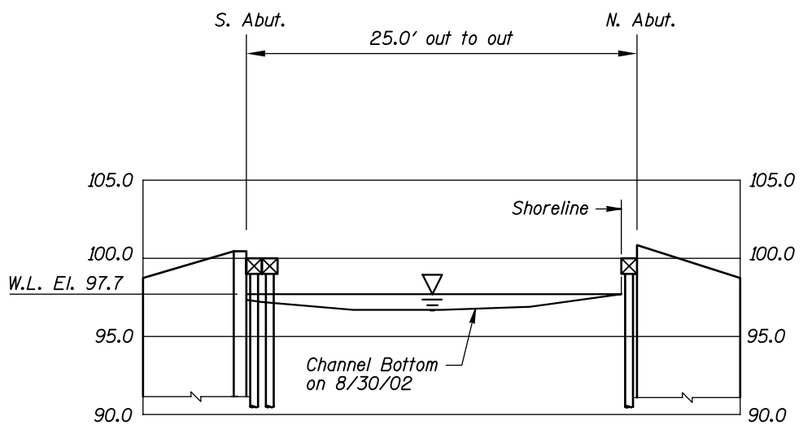
STRUCTURE NO. 88594
OVER INDIAN CREEK
DISTRICT 1, ST. LOUIS COUNTY

INSPECTION AND SOUNDING PLAN

Drawn By: PRH	COLLINS ENGINEERS, INC.	Date: AUG. 2002
Checked By: MDK	300 W. WASHINGTON, STE. 600 CHICAGO, ILLINOIS 60606 (312) 704-9300	Scale: NTS
Code: 35120006		Figure No.: 1



UPSTREAM FASCIA PROFILE



DOWNSTREAM FASCIA PROFILE

Note:

Refer to Figure 1 for General Notes.

MINNESOTA
DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION

STRUCTURE NO. 88594
OVER INDIAN CREEK
DISTRICT 1, ST. LOUIS COUNTY

UPSTREAM AND DOWNSTREAM FASCIA PROFILES

Drawn By: PRH	COLLINS ENGINEERS, INC.	Date: AUG. 2002
Checked By: MDK	300 W. WASHINGTON, STE. 600 CHICAGO, ILLINOIS 60606 (312) 704-9300	Scale: 1"=10'
Code: 35120006		Figure No.: 2

Photograph 1. View of the South Abutment, Looking Southwest.

Photograph 2. View of the North Abutment, Looking Northwest.

Photograph 3. View of Pile 6 at South Abutment, Looking East.

Photograph 4. View of South Abutment Pile Cap, Looking West.

Photograph 5. View of the Northeast Wingwall, Looking North.

Photograph 6. View of the Failing Backwall at North Abutment, Looking North.

Photograph 7. View of the North Abutment, Looking West.

Photograph 8. View of Pile 1 at North Abutment, Looking Northwest.

MINNESOTA DEPARTMENT OF TRANSPORTATION
OFFICE OF BRIDGES AND STRUCTURES
DAILY DIVING REPORT

INSPECTORS: Collins Engineers, Inc. DATE: August 30, 2002
ON-SITE TEAM LEADER: Daniel G. Stromberg, P.E. 21491
BRIDGE NO: 88594 WEATHER: Sunny, ± 75° F
WATERWAY CROSSED: The Indian Creek
DIVING OPERATION: SCUBA SURFACE SUPPLIED AIR
X OTHER Wading, due to low water levels
PERSONNEL: Michelle D. Koerbel, Matthew J. Lengyel
EQUIPMENT: Scraper, Lead Line, Sounding Pole, Probe Rod, Sounding Pole, Camera
TIME IN WATER: 1:00 P.M.
TIME OUT OF WATER: 1:30 P.M.
WATERWAY DATA: VELOCITY None/Negligible
VISIBILITY ± 1.0 Foot
DEPTH 1.0 feet maximum at North Abutment
ELEMENTS INSPECTED: North and South Abutments
REMARKS: The North Abutment was in poor condition. The northeast wingwall has failed and the backwall exhibited considerable movement with backfill escaping through 1-inch gaps between the planking. There was also a 1-foot-wide by 6-inch-high gap with escaping backfill in the North Abutment backwall. The pile cap at the North Abutment has been displaced and has rotated towards the embankment. Repair measures, consisting of steel beams and shims, have held the pile cap in its present position thus far. The bottom board of the southwest wingwall was 6 inches above the mudline with 6 inches of penetration behind the planking. A few of the timber piles exhibited delamination and splitting around the whole circumference of the pile.

FURTHER ACTION NEEDED: X YES _____ NO

Ideally, the North Abutment backwall and its northeast wingwall should be rebuilt and/or repaired to prevent further loss of backfill under the approach. Until repairs can be made, above and below water inspection should monitor the failing North Abutment components.

Reinspect the submerged substructure units at the normal maximum recommended (NBIS) interval of five (5) years.

MINNESOTA DEPARTMENT OF TRANSPORTATION
OFFICE OF BRIDGES AND STRUCTURES

UNDERWATER INSPECTION CONDITION RATING FORM

BRIDGE NO. 88594
INSPECTORS Collins Engineers, Inc.
ON-SITE TEAM LEADER Daniel G. Stromberg, P.E. 21491
WATERWAY CROSSED The Indian Creek

INSPECTION DATE August 30, 2002

NOTE: USE ALL APPLICABLE CONDITION DEFINITIONS AS DEFINED IN THE MINNESOTA RECORDING AND CODING GUIDE INCLUDING GENERAL, SUBSTRUCTURE, CHANNEL AND PROTECTION, AND CULVERTS AND WALL DEFINITIONS TO COMPLETE THIS FORM.

CONDITION RATING

			SUBSTRUCTURE						CHANNEL					GENERAL					
UNIT REFERENCE NO.		MAXIMUM DEPTH OF WATER	PILING	COLUMNS, SHAFTS, OR FACES*	FOOTINGS	DISPLACEMENT	OTHER (BACKWALL)	OVERALL SUBSTRUCTURE CONDITION CODE*	SCOUR	EMBANKMENT EROSION	EMBANKMENT PROTECTION	OTHER (DRIFT/DEBRIS)	OVERALL CHANNEL & PROTECTION CONDITION	CONCRETE	STEEL	TIMBER	LOSS OF SECTION	PREVIOUS REPAIR OR MAINTENANCE	OTHER
	UNIT DESCRIPTION	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	North Abutment	1.0’	6	N	N	5	4	4	7	N	N	N	7	N	N	6	N	6	N
	South Abutment	0.5’	6	N	N	6	6	6	7	N	N	N	7	N	N	6	N	N	N

*UNDERWATER PORTION ONLY

REMARKS: The North Abutment was in poor condition. The northeast wingwall has failed and the backwall exhibited considerable movement with backfill escaping through 1-inch gaps between the planking. There was also a 1-foot-wide by 6-inch-high gap with escaping backfill in the North Abutment backwall. The pile cap at the North Abutment has been displaced and has rotated towards the embankment. Repair measures, consisting of steel beams and shims, have held the pile cap in its present position thus far. The bottom board of the southwest wingwall was 6 inches above the mudline with 6 inches of penetration behind the planking. A few of the timber piles exhibited delamination and splitting around the whole circumference of the pile.

NOTES: ATTACH SKETCHES AS NEEDED, IDENTIFY REMARK BY REFERRING TO UNIT REFERENCE NO. AND REMARK NO.
USE GENERAL SECTION TO IDENTIFY OVERALL PRESENCE OF SPALLS, CRACKS, CORROSION, ETC.